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ABSTRACT

Four experiments designed to study attitudes toward United States Presidents are described. The project uses the conceptual framework and methodology of a mathematical theory of information integration to compile information on attitudes and opinion formation based on high school civics and history courses. Results of the research findings of each experiment are summarized in graphic form. (SHM)

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FINAL REPORT

~~PROGRESS REPORT~~

Project #10173

Contract No. OEC-9-71-0031 (508)

MATHEMATICAL THEORY OF ATTITUDE AND OPINION FORMATION BASED ON HIGH SCHOOL CIVICS AND HISTORY

SP005641

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SUMMARY OF RESULTS

This project studied attitudes toward U.S. Presidents using the conceptual framework and methodology of a mathematical theory of information integration. Subjects received sets of paragraphs of information about certain U.S. Presidents and evaluated them on general statesmanship. To do that requires the subjects to integrate the information in the paragraphs into a unitary attitude. Integration theory analyzes what processes control the integration.

Extremely good results were obtained.

1. Experiment I gave an extended test of both the parallelism prediction and the crossover prediction. Both were strongly supported. That means that the integration process obeyed a simple algebraic model, and specifically, an averaging model. (Reference: N. H. Anderson, "Integration Theory Applied to Attitudes about U.S. Presidents", Journal of Educational Psychology, 1972, in press.)

2. Experiment II addressed the problem of order effects in attitudes. A short-term recency effect was obtained, as well as further support for the averaging formulation. These data also supported the two-component theory of attitude structure. Despite short-term surface reaction to immediate propaganda, the basal component of opinion is rather permanent and resistant to change. (Reference: N. H. Anderson & A. J. Farkas, "New Light on Order Effects in Attitude Change", Journal of Personality and Social Psychology, 1973, in press.)

3. Experiment III was designed to test a postulated relation between McGuire's "innoculation theory" of resistance to persuasion and a somewhat different interpretation in terms of integration theory. McGuire's "paper tiger" effect was replicated, and it was shown that this could be interpreted as a high scale value-low weight situation in terms of integration theory. (Reference: A. J. Farkas, "The Paper Tiger Effect Interpreted in Terms of Integration Theory", Human Relations, submitted for publication.)

4. Experiment IV was conducted with children and used a simpler class of stimuli in order to test out the methodology developed for adults in the previous experiments to see if it would work with children. Results were excellent. The methodology is feasible with children. Furthermore, the same pattern of behavior occurred with children as with adults. (Reference: C. A. Butzin & N. H. Anderson, "Mathematical Representation of Children's Judgments", Developmental Psychology, submitted for publication.)

5. This project also saw the completion and publication of our collection of president paragraphs. This includes 220 paragraphs of graded value, 16 paragraphs about each of 9 presidents, and 8 paragraphs about each of 8 presidents. These paragraphs have been most useful in our work, and we believe that others will find them useful also. (Reference: N. H. Anderson, B. K. Sawyers, & A. J. Farkas, "President Paragraphs", Behavior Research Methods and Instrumentation, 1972, 4, 177-192.)

IMPLICATIONS AND CONCLUSIONS

Three levels of implication follow from the present results. These go from the specific types of experimental tasks studied here up to more general implications for education in the schools.

First, the experiments have followed out earlier promise and have given strong support to information integration theory in the study of social attitudes. The integration model has repeatedly satisfied some very exacting tests, both qualitative and quantitative. Forming an opinion about how well a past U.S. President did his job is a cognitive process of considerable complexity. Yet the experiments show that such processes obey simple quantitative laws.

Second, the results have extended and reaffirmed the theoretical unifying value of the general principle of information integration. This principle has had a unifying effect in person perception, and the present extension to social attitudes is a significant broadening of the theoretical scope. Just as the principle of reinforcement is important in learning, so the principle of information integration is important in social judgment.

Third, the present research has given some measure of support for the concept of a direct experimental analysis of problems of attitude and opinion in classroom settings. Attitudes and opinions are vital in the operation of a democracy and in the transmission of our cultural heritage. Yet very little study has been made of these problems relative to teaching reading, for instance.

In this respect, we hope that these papers will stimulate greater interest in U.S. History as a source of materials for attitude research. There are many advantages, as noted in the attached reprint. It is hoped that it will be possible to extend this work, moving from the laboratory and working directly in the classroom over extended periods of time.

EXPERIMENT I

Purpose. This experiment was designed to test two predictions of the mathematical integration model. These are the parallelism prediction and the crossover prediction. The parallelism prediction follows from the basic integration model under suitable conditions of experimental design. However, it leaves open the question of whether the information is integrated by an adding process or by an averaging process. Use of an auxiliary pair of conditions allows a critical test between these two integration models.

Method. Subjects read booklets, each containing paragraphs that described the actions of some U.S. President. After finishing the booklet, they rated the president on a 0 to 10 scale of statesmanship. Each subject judged eight different presidents, with a different sequence of information for each. Use of an 8 x 8 greco-latin square allowed complete balancing of sequences, presidents, and order of presentation. Subjects were 48 students from introductory psychology.

Results and Discussion. The data from this experiment are in Figure 1. Each data point represents the mean response to one of the eight sequences of information. Two features of Figure 1 deserve emphasis.

First, the six data points connected by solid lines are essentially parallel. The upper curve represents a High paragraph; it is paired with either a Low, Neutral, or High paragraph, as listed on the horizontal. The lower curve represents a Low paragraph, paired similarly. These two curves validate the integration model which predicts that they should be parallel.

The two points connected by dashed lines support the averaging hypothesis and rule out the adding hypothesis. The response to High is more extreme when it is alone than when it is paired with Neutral, 7.2 vs 6.6. The same holds for the comparison between Low alone and Low paired with Neutral, 3.8 vs 4.3. The adding hypothesis requires Neutral to change both High and Low in the same direction, contrary to the data. The averaging hypothesis predicts that Neutral should average in with both High and Low, making both less extreme as is observed.

Conclusion. The data give clear and solid support to the basis averaging model of information integration theory. Attitudes on social issues appear to follow simple quantitative laws.

Figure 1

U.S. Presidents characterized by descriptive paragraphs were judged on statesmanship. The paragraphs formed a 2x3 design, and the parallelism of the two solid curves supports the information integration model. The two points connected by dashed lines provide a critical test between the adding and the averaging hypotheses.

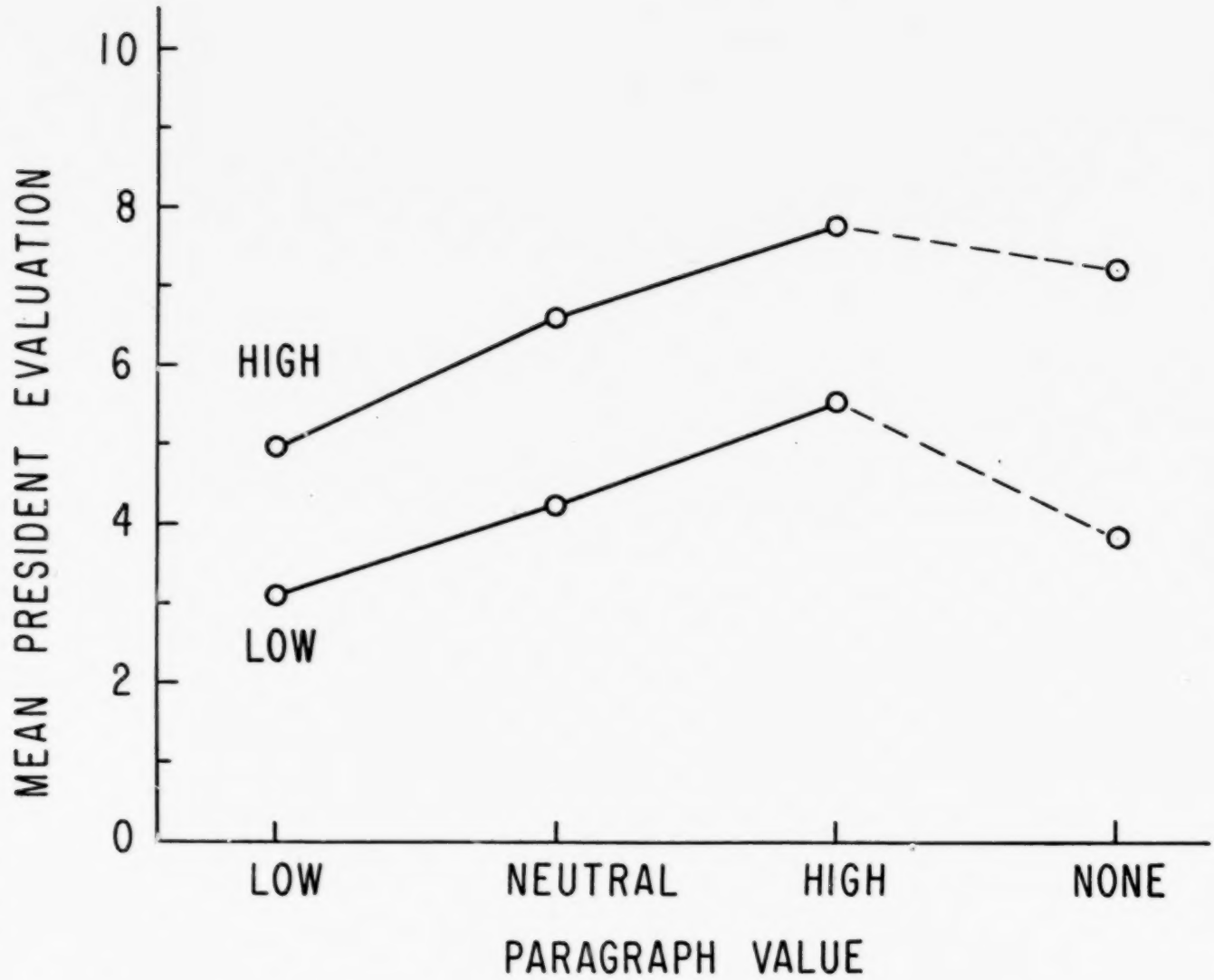

MEAN PRESIDENT EVALUATION
10
8
6
4
2
0
HIGH
LOW
LOW
NEUTRAL
HIGH
NONE
PARAGRAPH VALUE

Figure 1

EXPERIMENT II

Purpose. The purpose of this experiment was to evaluate the effects of the order in which people receive information. Both primacy and recency effects have been reported in the literature on attitude change, but not much consensus has been obtained about the conditions that produce either one.

Method. Subjects read booklets, each containing eight paragraphs that described the actions of some U.S. President. After finishing each successive paragraph in the booklet, they rated their cumulative opinion about the president on a statesmanship dimension. Each subject judged eight different presidents, with a different sequence of information for each sequence. Altogether, 16 different information sequences were used in a 2^4 factorial design.

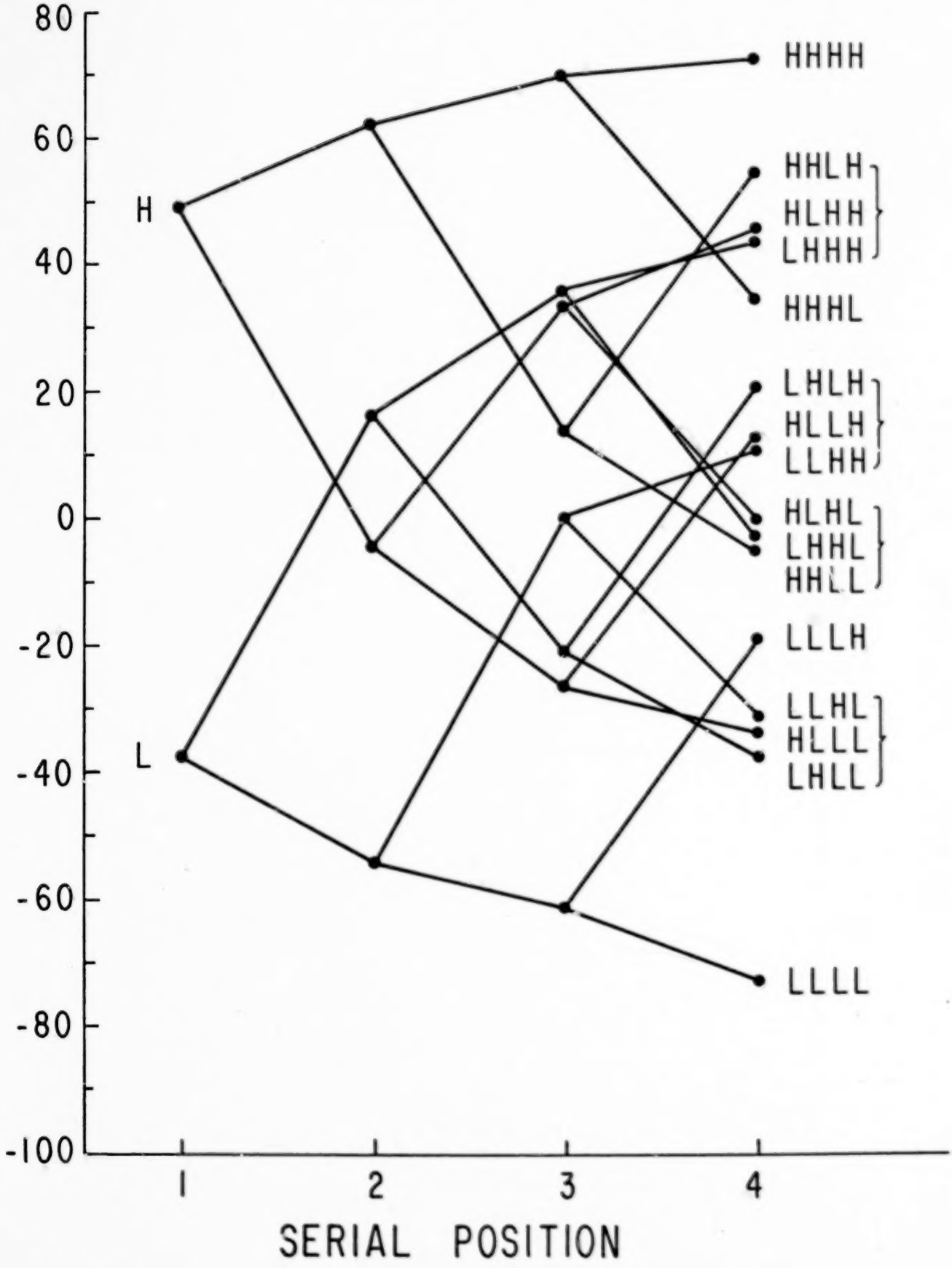
Results and Discussion. The main pattern of results is in Figure 2 which shows mean response at each point in each of the 16 information sequences. Despite its seeming intricacy, the pattern is quite simple and orderly. Each positive paragraph (H) raises the opinion; each negative paragraph lowers the opinion. The crossovers of the complementary curves demonstrate a recency effect. Finally, there is a decrease in susceptibility to influence as information accumulates.

Quantitative analysis showed that the data obeyed the serial integration model of averaging theory. Each paragraph contributes a certain amount to the final opinion, an amount that depends on its order in the information sequence.

The shape of the recency effect is shown in Figure 3. The bottom curve (R4) plots the relative influence of the information in each serial position on the final opinion. The curve is flat over the first three positions; they contribute equally. The recency is concentrated at the serial position immediately preceding the response.

The curve R3 represents the same thing for the response at serial position 3. It also shows a flat initial limb, with the recency concentrated at the last serial position. But the striking feature of this curve is that its recency effect vanishes in the final opinion, as already noted for R4. The recency is only short-term in nature, not permanent or lasting.

Conclusion. These data support the two-component hypothesis of attitude structure. The surface component, represented here by recency, reflects the immediate influence of just preceding information and decays away very quickly. The basal component is more permanent and stable and continues on underneath even though it may be masked by the surface component on a temporary basis.


80
60
40
20
0
-20
-40
-60
-80
-100
H
L
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1
2
3
4
SERIAL POSITION

Figure 2

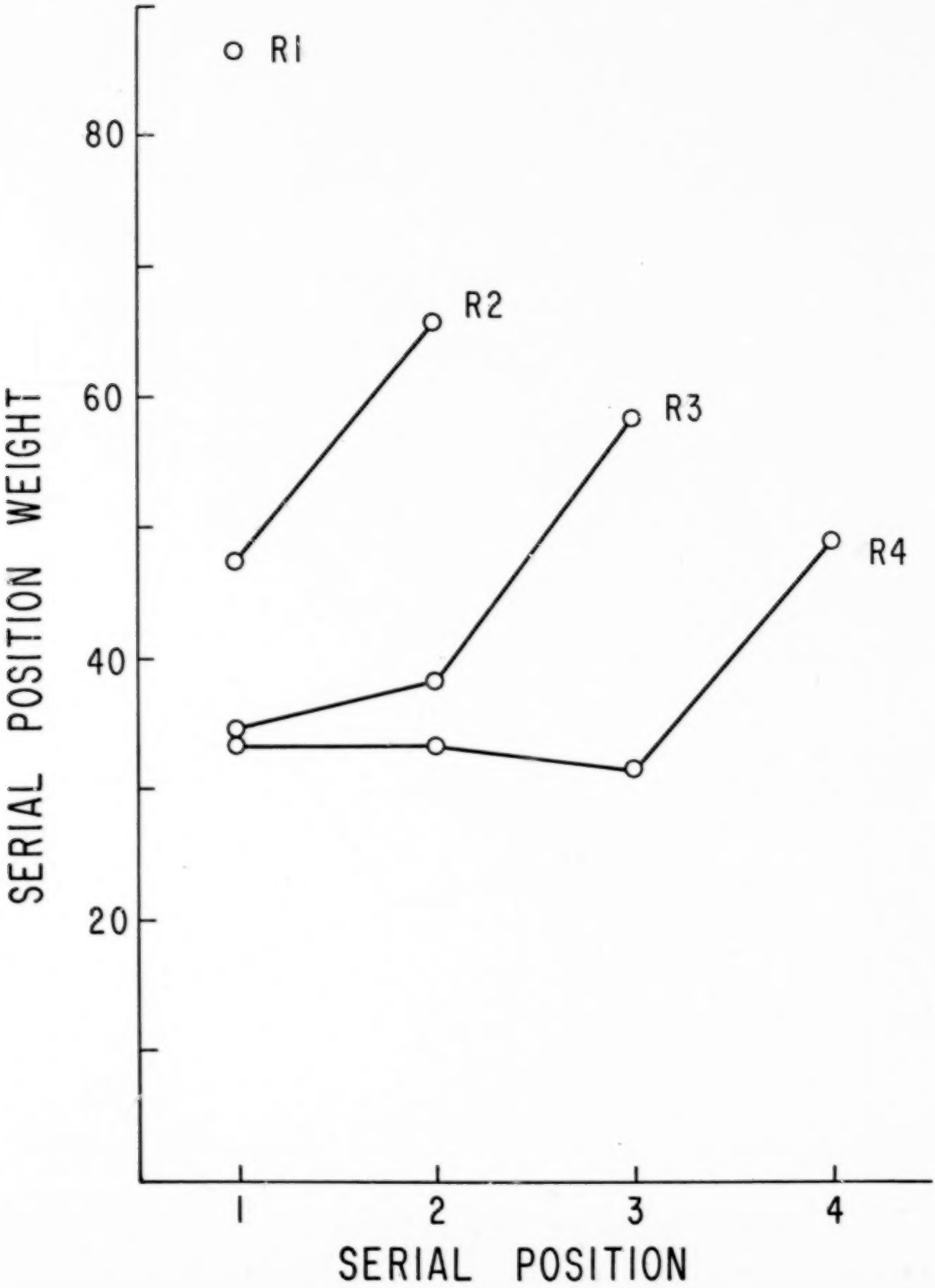
R1
R2
R3
R4
80
60
40
20
SERIAL POSITION WEIGHT
1
2
3
4
SERIAL POSITION

Figure 3

Figure 2

Mean judgment of statesmanship of various U.S. Presidents characterized by sequences of descriptive paragraphs. H and L denote pairs of favorable or unfavorable paragraphs. Sixteen different information sequences were used, as indicated.

Figure 3

Mean effect of each serial position on final response. Entries are proportional to the weight parameter at each serial position. R1, R2, R3, and R4 denote serial curves for the response at serial positions 1, 2, 3, and 4, respectively.

EXPERIMENT III

Purpose. To test out some implications of McGuire's innoculation theory of resistance to persuasion in terms of information integration theory.

Method. Subjects first received a communication that defended some cultural truism: either a Supportive defense that simply repeated everyday arguments in favor of the truism, or a Refutational defense that mentioned some arguments against the truism and then refuted those arguments. In half the cases, these defensive communications were followed by communications that attacked the truism. Each of 48 subjects served in each of these four experimental conditions with appropriate counterbalancing of truism, defense, and order of presentation. In addition, separate estimates were obtained of the weight and scale value of each communication, as well as of the initial opinion.

Results. Two main results were obtained. First, the use of the separate estimates of weight and scale value allowed reasonably good predictions of the integrated opinion. Second, the paper tiger effect was replicated despite some irregularities in two of the information sequences due apparently to a change in health consciousness in the last ten years.

Conclusion. The paper tiger effect receives a very simple interpretation in terms of information integration theory. The high initial opinion produced by the supportive defensive actually is high only in scale value; it has a low weight. Because of this low weight, the attack has a much stronger effect than for the refutational defense.

EXPERIMENT IV

Purpose. To test out with children the response methodology developed in the above experiments with adults, with a view to extending the work on attitude formation back into the grade schools.

Method. Subjects judged how much they would like to play with certain combinations of toys. Responses were made on a rating scale of seven faces ranging from a deep frown to a large smile. The toys were prescaled separately for each of the 30 children, age 5 to 13, who served as subjects in this experiment.

Results and Discussion. The main results of this experiment are in Figure 4. Figure 4 tests the parallelism prediction of information integration theory. As can be seen, the data curves are approximately parallel. The middle panel, for the 10 younger children, is less regular than the right panel for the 20 older children. However, the deviations from parallelism were nonsignificant in both cases, and the apparent irregularity may simply reflect the smaller number of children in the younger group.

The data also showed the crossover interaction. Adding a toy of Medium value raises the attractiveness of an unattractive Low toy, but lowers the attractiveness of an attractive High toy.

These data, therefore, follow the same integration model as in Experiments I and II on social attitudes.

Conclusion. Two conclusions follow from this experiment. First, it is feasible to use our experimental methods with younger children. This had been a worry because we require that they use ratings as an equal-interval scale. It was for this reason that the simpler toy stimuli were used here. These favorable results mean that it will be experimentally feasible to extend the work on social attitudes back to first grade. Second, the data show the same pattern for toys as for social opinions. That suggests that common judgmental processes are at work in a diverse group of situations, and that the present results have considerable generality.

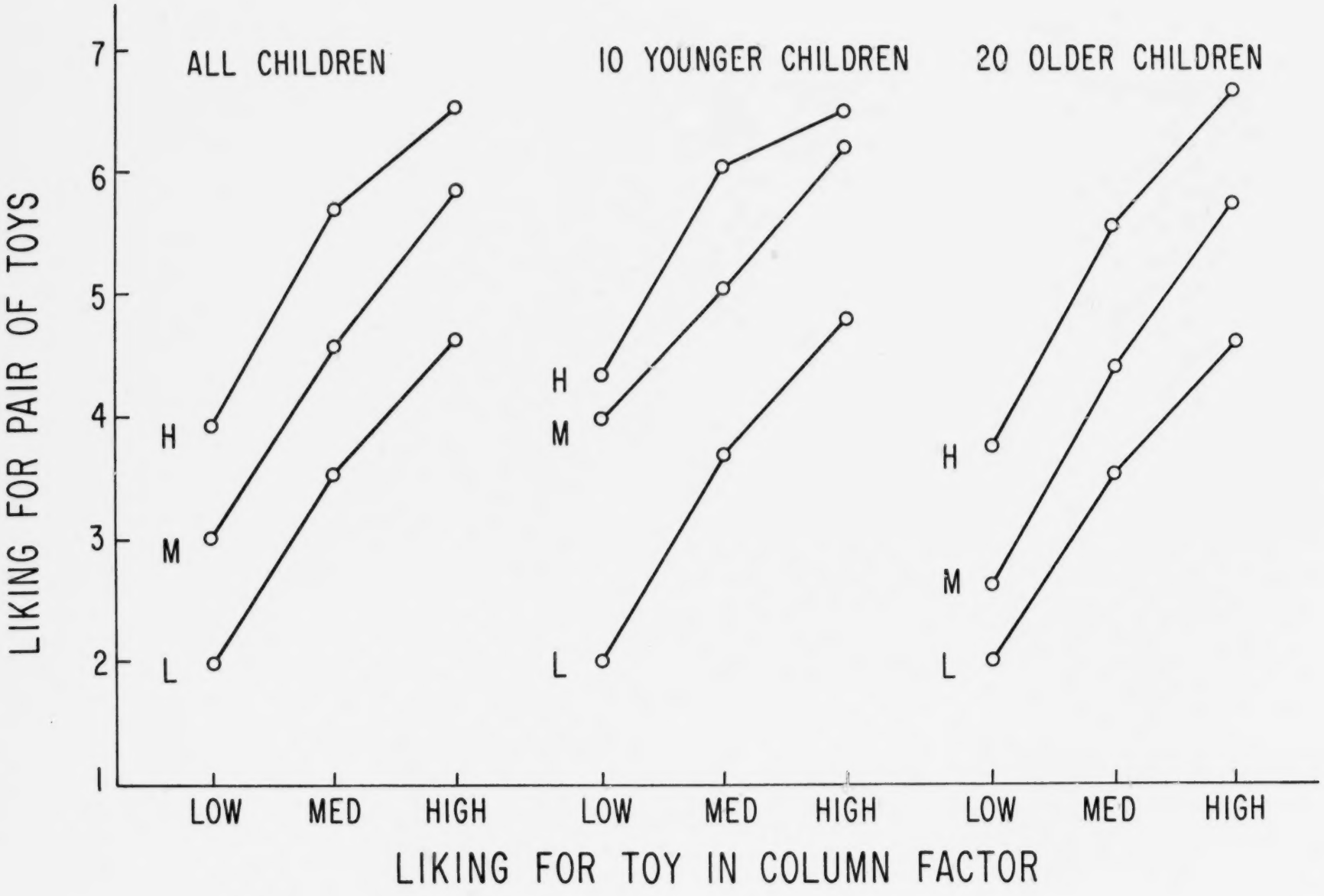
ALL CHILDREN
10 YOUNGER CHILDREN
20 OLDER CHILDREN
LIKING FOR PAIR OF TOYS
7
6
5
4
3
2
1
H
M
L
LOW
MED
HIGH
LIKING FOR TOY IN COLUMN FACTOR

Figure 4

Figure 4

Mean judgment of pairs of toys, constructed as in a 3x3 factorial design. H, M, and L denote toys of high, medium and low likableness. Parallelism supports the information integration model. Deviations from parallelism were not statistically significant.

Appendix

This appendix includes the set of president paragraphs that has been used in this research. They were published in Behavior Research Methods & Instrumentation, 1972, 4, 177-192.

Certification: OE Project No. 10173

R. C. Weinberger
Contract & Grant Officer

October 9, 1972
Date

Norman H. Anderson
Principal Investigator

October 9, 1972
Date